



Monitor the Surface Deformation in Metropolitan Taipei Basin by Using PS-InSAR Techniques

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Taipei is the most densely populated area and the center of politics and economics in Taiwan. However, the composite geohazards might occur in Taipei area, in which the active Shanchiao fault located in the western margin of Taipei basin and the active Tatun volcano group located 15 km to the north of the basin. Therefore, it is not only an important scientific topic but also a crucial social issue to better understand the assessment and mitigation of geological hazard in the metropolitan Taipei city. We use Persistent Scatterers interferometric synthetic aperture radar (PSInSAR) and small baseline methods to calculate the surface deformation rate with the constraints of continuous GPS and precise leveling measurements. The advantages of PSInSAR technique are wide, periodic, and stable in the temporal and spatial pattern of deformation. In this study C-band ERS-1/2 (1996/1-1999/9), ENVISAT (2003/1-2008/3) and L-band ALOS (2007/4-2011/6) SAR images are used to carry out the surface deformation in three periods. Based on the results of different periods of PS-InSAR, the slant range displacement (SRD) was variable via time which might be related to the deformation in different depth of loose deposits in Taipei basin. Previous study suggested that some factors influence the surface deformation change, including soil compaction, water-table change and tectonic movement. Consequently the assessment in activity of the Shanchiao fault, the induced deformation due to the fluctuation of the water table and the soil compaction should be removed. In general, the average SRD rate in the footwall and hanging wall of the Shanchiao Fault was about 12.2 mm/yr and 9.1 mm/yr, 1.5 mm/yr and 4.0 mm/yr, respectively with descending mode ERS-1/2 an ENVISAT radar images. For the ascending ALOS radar image, the average SRD rate in the footwall and hanging wall of the Shanchiao Fault was about -9.5 and -11.3 mm/yr, respectively. These results suggests that the slight uplift observed in the period of 2003/1-2008/3 and the slight subsidence occurred in the periods 1996/1-1999/9 and 2007/4-2011/6. The future study will focus on the modeling of induced deformation from the fluctuation of the water table and the soil compaction in order to assess the tectonic movement of the Shachiao fault.